

CLAIMS

The invention is claimed as follows:

1. A battery pack comprising
 - a battery device having a cathode, an anode and a polymer electrolyte, with a terminal being taken out from each of the cathode and the anode;
 - a packaging unit having a first area, carrying a housing recess for accommodating the battery device therein, a second area formed in continuation to the first area, and a third area formed in continuation to the second area substantially at right angles to the first area;
 - 10 a frame mounted around the battery device, wherein the battery device is accommodated in the housing recess and covered up by and bonded to the second area; and
 - a connection substrate mounted on the frame, and including a terminal unit connected to the terminals, the terminal unit being adapted to be electrically connected to an external apparatus; wherein
 - the battery device is accommodated in the housing recess, the second area, lying opposite to the terminals of the accommodated battery device, is folded back against the first area to cover up a first surface of the battery device, exposed to outside, the first and second areas being then bonded to each other,
 - 20 the terminals of the battery device, accommodated in the housing recess and covered up by and bonded to the second area, are connected to the connection substrate, the frame is mounted around the battery device and the connection substrate is mounted to the frame;
 - the third area of the packaging unit is folded against the second area to cover 25 up a second surface opposite to the first surface of the battery device, accommodated in the housing recess, covered up by and bonded to the first area; with the third area, and
 - the third area and the first area are bonded to each other.
- 30 2. The battery pack according to claim 1 wherein the battery device is packaged in an evacuated state.

3. The battery pack according to claim 1 wherein the battery device accommodated in the housing recess, covered up by the second area and evacuated, is hermetically sealed so that, in cross-section, the second surface thereof is a short side and the first surface thereof is a long side; and wherein
5 the frame is mounted on a peripheral rim of the second surface.

4. The battery pack according to claim 1 wherein the packaging unit includes a polypropylene layer, an aluminum layer and a nylon layer, laminated sequentially from the inner side, and is bonded to itself by thermal fusion with a
10 polypropylene side in a facing relationship.

5. The battery pack according to claim 1 wherein the frame includes an opening for causing the terminal unit to be exposed to outside therethrough and wherein the connection substrate is held by a retention section of the frame as the
15 terminal unit is exposed to outside through the opening.

6. A method for producing a battery pack comprising:
housing a battery device, having a cathode, an anode and a polymer electrolyte and including a terminal taken out from the cathode and a terminal taken out from the
20 anode, in a housing recess of a packaging unit, adapted for accommodating the battery device therein, the packaging unit having a first area, carrying the housing recess, a second area formed in continuation to the first area, and a third area formed in continuation to the second area substantially at right angles to the first area;

25 folding the second area, lying opposite to the terminals of the battery device, accommodated in the housing recess, against the first area, to cover up the first surface of the battery device, exposed to outside, to bond the first area and the second area to each other;

30 connecting the terminals of the battery device, accommodated in the housing recess and covered up by and bonded to the second area, to a connection substrate provided with a terminal unit adapted for being electrically connected to an external apparatus, mounting a frame around the battery device and mounting the connection substrate on the frame;

folding the third area of the packaging unit against the second area to cover up a second surface opposite to the first surface of the battery device, accommodated in the housing recess, covered up by and bonded to the second area, with the third area; and

5 bonding the third area to the first area.

7. The method for producing a battery pack according to claim 6 wherein, in the step of folding the second area, the battery device is packaged in an evacuated state.

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8. The method for producing a battery pack according to claim 6 wherein the

battery device, accommodated in the housing recess, covered up by the second area and evacuated, is hermetically sealed in the step of folding the second area so that,

15 in cross-section, the second surface thereof is a short side and the first surface thereof is a long side; and wherein

the frame is mounted in the step of connecting the terminals on a peripheral rim of the second surface.

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9. The method for producing a battery pack according to claim 6 wherein the packaging unit is made up by a polypropylene layer, an aluminum layer and a nylon layer, laminated sequentially from the inner side, and is bonded to itself by thermal fusion with a polypropylene side in a facing relationship.

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10. The method for producing a battery pack according to claim 6 wherein the frame includes an opening for causing the terminal unit to be exposed to outside therethrough and wherein the connection substrate is held in the step of connecting the terminals by a retention section of the frame as the terminal unit is exposed to outside through the opening.

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11. A battery pack comprising
 - a battery device having a cathode, an anode and a polymer electrolyte, with a terminal being taken out from each of the cathode and the anode;
 - a first packaging member having a housing recess for accommodating the battery device therein, and a connecting piece around the housing recess;
 - a second packaging member having at least a first area for covering up a first surface, exposed to outside, of the battery device accommodated in the housing recess, and a second area for covering up a second surface of the battery device opposite to the first surface;
- 10 a frame mounted around the battery device, accommodated in the housing recess and covered up by and bonded to the first area; and
 - a connection substrate mounted on the frame, and including a terminal unit for electrical connection to an external apparatus, the terminal unit being connected to the terminals; wherein
- 15 the battery device is accommodated in the housing recess of the first packaging member, a first surface of the battery device, exposed to outside, is covered up by the first area of the second packaging member, the connecting piece is bonded to the first area;
 - the terminals of the battery device, accommodated in the housing recess, and covered up by and bonded to the first area are connected to the connection substrate, the frame is mounted around the battery device, the connection substrate is mounted on the frame;
 - the second area of the second packaging member is folded against the first area thereof to cover up a second surface opposite to the first surface of the battery device, accommodated in the housing recess of the first packaging member and covered up by the first area, with the second area; and wherein
 - the first packaging member is bonded to the second area of the second packaging member.
- 30 12. The battery pack according to claim 11 wherein the battery device is packaged in an evacuated state.

13. The battery pack according to claim 11 wherein the battery device, accommodated in the housing recess, covered up by the second area and evacuated, is hermetically sealed so that, in cross-section, the second surface thereof is a short side and the first surface thereof is a long side; and wherein the frame is mounted on a 5 peripheral rim of the second surface.

14. The battery pack according to claim 11 wherein the frame includes an opening for causing the terminal unit to be exposed to outside therethrough and wherein the connection substrate is held by a retention section of the frame as the 10 terminal unit is exposed to outside through the opening.

15. The battery pack according to claim 11 wherein the second packaging member is formed of a material stiffer than the material of the first packaging member.

15 16. The battery pack according to claim 11 wherein the first packaging unit includes

a layer of polypropylene, an aluminum layer and a nylon layer, laminated sequentially from the inner side, and is bonded to itself by thermal fusion of the polypropylene; and wherein

20 the second packaging member is bonded to the first packaging member so that an outer edge of the second packaging member lies inwardly of an outer edge of the connecting piece of the first packaging member and wherein a surface of the second packaging member which faces inwards when the first packaging member is covered up by the second area is caused to face the first surface of the first packaging member 25 and is bonded in this state to the first surface of the first packaging member.

17. A method for producing a battery pack comprising:
housing a battery device, having a cathode, an anode and a polymer electrolyte and including a terminal taken out from the cathode and a terminal taken out from the 30 anode, in a housing recess formed in a first packaging member for accommodating the battery device therein, the first packaging member including a connecting piece formed around the housing recess;

covering up a first surface, exposed to outside, of the battery device accommodated in the housing recess, with a first area of a second packaging member, the second packaging member including at least the first area covering up the first surface and a second area covering up a second surface of the battery device opposite to the first surface, and bonding the connecting piece to the first area;

5 connecting the terminals of the battery device, accommodated in the housing recess and covered up by and bonded to the first area, to a connection substrate, provided with a terminal unit adapted for being electrically connected to an external apparatus, mounting a frame around the battery device and mounting the connection substrate on the frame;

10 folding the second area of the second packaging member against the first area to cover up the second surface opposite to the first surface of the battery device, accommodated in the housing recess of the first packaging member and covered up by the first area, with the second area; and

15 bonding the first packaging member to the second area of the second packaging member.

18. The method for producing a battery pack according to claim 17 wherein the battery device is packaged in the step of covering up the first surface in an 20 evacuated state.

19. The method for producing a battery pack according to claim 17 wherein, in the

25 step of covering up the first surface, the battery device accommodated in the housing recess, covered up by the second area and evacuated, is hermetically sealed so that, in cross-section, the second surface thereof is a short side and the first surface thereof is a long side; and wherein

in the step of connecting the terminals, the frame is mounted on a peripheral rim of the second surface.

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20. The method for producing a battery pack according to claim 17 wherein the frame is provided with an opening for exposing the terminal unit to outside

therethrough and wherein, in the step of connecting the terminals, the connection substrate is held by a retention section of the frame as the terminal unit is exposed to outside through the opening.

5 21. The battery pack according to claim 17 wherein the second packaging member is formed of a material stiffer than the material of the first packaging member.

10 22. The battery pack according to claim 17 wherein the first packaging unit is

10 includes a layer of polypropylene, an aluminum layer and a nylon layer, laminated sequentially from the inner side, and is bonded to itself by thermal fusion of the polypropylene; and wherein

15 in the step of covering up the first surface, the second packaging member is bonded to the first packaging member so that an outer edge of the second packaging member lies inwardly of an outer edge of the connecting piece of the first packaging member; and wherein

20 in the step of bonding the first packaging member, a surface of the second packaging member which faces inwards when the first packaging member is covered up by the second area faces the first surface of the first packaging member and is bonded in this state to the first surface of the first packaging member.